## REMARKS/ARGUMENTS

Claims 1-7 and 32-40 remain in this application. Claims 8-31 were previously canceled. Claim 40 is withdrawn. Claims 41-43 are new.

1. Philips Patntverwaltung Gmbh (DE 3047888)

The Examiner rejected claims 1-7 and 32-39 under 35 U.S.C. 102(b) as being anticipated by Philips Patntverwaltung Gmbh (DE 3047888). In whole, the Examiner's rejection is based on that "Philips Patntverwaltung Gmbh discloses a diamond film with the claimed thickness that has a lattice structure similar to diamond, which suggests the exclusion of graphite in the film."

As the Examiner is well aware, "a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Company of California*, 2 U.S.P.Q. 2d. 1051, 1053 (Fed. Cir. 1987), *cited in,* M.P.E.P. §2131. "The identical invention must be shown in as complete detail as is contained in the . . . claim." *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q. 2d 1913, 1920 (Fed. Cir. 1989). Thus, if any feature taught by the claimed invention is not taught by the reference cited by the Examiner, then the claimed invention and the reference are patentably distinct. In such a case, a rejection under 35 U.S.C. § 102 is improper.

First and foremost, Philips discloses a carbon coating i.e. amorphous carbon, not a diamond film. Carbon coating and the nano-crystalline diamond matrix as claimed by the Applicant are not analogous products, having significantly different properties. As Philips does not disclose a diamond film, all claims presented by the Applicant are allowable over Philips.

Second, the Examiner asserts that as the carbon coating has a structure similar to diamond, it suggests the exclusion of graphite. However, the Examiner's inference is not supported by any facts and contradicts known scientific principles.

The statement that the Philips carbon coating resembles that of diamond gives no indication whatsoever of the weight percent of graphite in the coating. In fact, Philips describes an epitaxy carbon coating process. Such processes are known by those skilled in the art as having a significant weight percent of graphite that is far greater than "substantially free of graphite inclusions", "3 weight percent of graphite", and "1 weight percent of graphite", as respectively claimed by Applicant in claims 1, 32 and 33. Accordingly, any inference made must be that the carbon coating of Philips has a weight percent of graphite in excess of that being claimed. As such, claims 1, 32 and 33 are allowable over Philips and dependent claims 2-7 and 34-39 are necessarily also allowable.

Third, the Examiner never addresses the limitations of claims 2-4, 6-7 and 34-39. Particularly important is the limitation of claims 7, 34 and 35, respectively requiring an "average root mean square surface roughness of less than 5.00 nm", "less than 2.0 nm", and "less than 1.5 nm", to which the Examiner perfunctorily rejected without any discussion or argument. Clearly, rejections to aforementioned claims 2-4, 6-7 and 34-39 under 102(b) without any supporting evidence or argument is improper. Accordingly, claims 2-4, 6-7 and 34-39 are allowable over Philips.

2. Aida (5,225,275)

The Examiner rejected claims 1-7 and 32-39 under 35 U.S.C. 102(b) as being anticipated by Aida (US Patent No. 5,225,275). For the rejection to be proper, the Examiner's must establish a prima facie case that Aida teaches each and every limitation as claimed by the Applicant.

With regards to claims 1, 31 and 33, the Examiner argues that Aida discloses a "diamond film having very low graphite inclusions (see FIG.5)." However, the Examiner then blanketly rejects the aforementioned claims without identifying any disclosure of Aida that teaches Applicant's claimed weight percent of graphite. Without need for explanation, generically stating that a patent discloses low graphite inclusions and merely identifying a Figure without any supporting discussion provides no teaching that the weight percent of Aida's graphite inclusions are within the claimed limitations. Accordingly, the Examiner has failed to show that Adia teaches Applicant's weight percent of graphite limitations and, thus, claims 1, 32 and 33 are patentable over Aida.

Additionally, an inference that the diamond film of Aida is within Applicant's claimed weight percent of graphite inclusion cannot be made. First, Aida acknowledges that the diamond film has graphite inclusions. Col. 8, lines 11-19. Second, the amount of graphite is substantial as compared to the weight percent claimed by Applicant. This is shown by FIGS. 5-7 of Aida in which the curves float well-above the baseline due to non-diamond carbon and graphite in the film. Likewise, the rounded, non-pronounced peak around 1580 also indicates the presence of non-diamond carbon and graphite in the film. Although the exact weight percent of graphite cannot be determined by the Figures, the illustrative curves indicate an abundance of graphite that is certainly more than the weight percent claimed in claims 1, 32 and 33. Accordingly, the only inference that can be made based on the objective evidence is that the diamond film of Aida includes a weight percent of graphite inclusions that is well beyond the limitations presented in claims 1, 32 and 33 of the subject application.

As the Examiner has not established a prima facie case with respect to claims 1, 32 and 33 based on Aida, Applicant respectfully requests that the rejections under 102(b) be withdrawn. Furthermore, as claims 2-7 and 34-39 depend from claim 1, these claims are also in condition for allowance.

The Examiner rejected claims 7, 34 and 35 by merely stating that the claimed limitations pertaining to average root mean square surface roughness are inherent. In establishing a prima facie case, whether a limitation is inherent must be properly supported by factual evidence. Applicant objects to the rejection as being improper since the Examiner failed to provide any evidence, justification or rationale in support of the inference.

First, Aida does not explicitly teach the diamond film having surface roughness within the limitations claimed by Applicant.

Second, for the Examiner's inference to be proper, it would require that diamond film formed in accordance with CVD processes, such as the process of Aida, to possess the claimed surface roughness limitations. Aida provides no such suggestion.

Furthermore, any inference made must be drawn contrary to the Examiner's position. That is, diamond film formed from high temperature CVD processes, as described in Aida, are not known to produce diamond film having an average root mean square surface roughness less than 5.00 nm, 2.00 nm and 1.5 nm, as respectively claimed in claims 7, 34 and 35. For example, the high temperature CVD process of Gruen et al ('511 and '760 ) produces films having a surface roughness of 30 to 376 nm, well above that claimed by Applicant.

The reason that high temperature CVD processes produce diamond films having greater surface roughness, as compared to the claimed invention, is that high temperatures cause faster, less controllable rate of crystallite growth, such that relatively large crystallites are formed.

In contrast, the diamond film of the present invention may be made extraordinarily smooth since it is grown at a low temperature, e.g. ambient temperature, thereby allowing for slow, controlled and consistent growth of crystallites.

The difference in surface roughness between the claimed film and the Aida film is analogous a road covered with large rocks compared to small gravel. With large rocks, the ride would be very bumpy. On the other hand, a road covered with small gravel would provide a much smoother ride.

As the Examiner has not established a prima facie case with respect to claims 7, 34 and 35, Applicant respectfully request that the rejections under 102(b) based on Aida be withdrawn.

In similar fashion, the Examiner makes an inference that the intrinsic stress limitations of claims 36-39 are inherent in the diamond film of Aida. However, as Aida provides no teaching with regards to intrinsic stress and the Examiner has provided no factual basis for his inference, the inference is improper. For example, the Examiner failed to identify any part of Aida that teaches how the process is controlled such that film is produced with compressive stress, or the opposite with tensile stress, or with no mechanical stress. Again, it is the Examiner's responsibility to establish a prima facie case, which requires more than an unsupported assertion. Accordingly, claims 36-39 are believed to be allowable over Aida.

3. Wu et al. (5,209,812)

The Examiner rejected claims 1-7 and 32-39 under 35 U.S.C. 102(b) as being anticipated by Wu et al (US Patent No. 5,209,812).

"[A] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Company of California*, 2 U.S.P.Q. 2d. 1051, 1053 (Fed. Cir. 1987), *cited in,* M.P.E.P. §2131. It is the Examiner's burden in establishing a prima

facie case to show that Wu et al. teaches each and every limitation as claimed by the Applicant.

With regards to claims 1, 32 and 33, the Examiner argues that Wu et al discloses a "diamond film having very low graphite inclusions (see FIG. 8)." However, Wu et al. is silent as to the exact weight percent of graphite inclusion. That is, there is no explicit teaching that Wu et al. meets Applicant's claimed limitations. Notwithstanding, the Examiner perfunctorily rejected the aforementioned claims without identifying any disclosure of Wu et al. that teaches Applicant's claimed weight percent of graphite.

It is improper for the Examiner to arbitrarily pick a weight percent of graphite inclusions that is within the claimed limitations, without having any objective support. That is, the Examiner has presented no evidence that a "small amount" of weight percent of graphite is within the claimed ranges, as opposed to any other weight percent such as for example 5 weight percent of graphite inclusions.

Additionally, an inference cannot be made that the graphite inclusions of Wu et al. are within the claimed range. The shape of the peak at around 1580 of Figure 7 indicates amorphous carbon on top of a measurable amount of graphite. Likewise, the curve of Figure 8 also indicates the presences of graphite. The detected amount of graphite illustrated by Figures 7 and 8, suggest graphite inclusions greater than that claimed by Applicant. This is consistent with prior art vapor deposition techniques, which are not known to form diamond film having a weight percent of graphite inclusions as low as that claimed in the present application.

As the Examiner has not established a prima facie case with respect to claims 1, 32 and 33 based on Wu et al., Applicant respectfully requests that the rejections under 102(b) be withdrawn. Furthermore, as claims 2-7 and 34-39 depend from claim 1, these claims are also in condition for allowance.

Regarding claims 7, 34 and 35, the Examiner rejected these claims by merely stating that the limitations pertaining to average root mean square surface roughness are inherent. In establishing a prima facie case, whether a limitation is inherent must be properly supported by factual evidence. Here, the Examiner provides no evidence in support of the inference and, therefore, the inference is impermissible.

For the Examiner's inference to be proper, it would require that diamond film formed in accordance with CVD process, such as the disclosed process of Wu et al., to possess the claimed surface roughness limitations. Wu et al. provides no such suggestion. Furthermore, any inference made must be drawn contrary to the Examiner's position. That is, diamond film formed from high temperature CVD processes, as described in Wu et al., are not known to produce diamond film having an average root mean square surface roughness less than 5.00 nm, 2.00 nm and 1.5 nm, as respectively claimed in claims 7, 34 and 35. For example, the high temperature CVD process of Gruen et al ('511 and '760 ) produces films having a surface roughness of 30 to 376 nm, well above that claimed by Applicant.

The reason the high temperature CVD processes produce diamond films having greater surface roughness, as compared to the claimed invention, is that high temperatures cause faster, less controllable rate of crystallite growth, such that relatively large crystallites are formed.

In contrast, the diamond film of the present invention is grown at a low temperature, e.g. ambient temperature, thereby allowing for slow, controlled and consistent growth of crystallites. The result is an exceptionally smooth diamond film having a surface roughness not achieved by high temperature CVD processes.

As the Examiner has not established a prima facie case with respect to claims 7, 34 and 35, Applicant respectfully request that the rejections under 102(b) based on Wu et al. be withdrawn.

Regarding claims 36-39, the Examiner makes an inference that the intrinsic stress limitations of these claims are inherent in the diamond film of Wu et al. However, as Wu et al. provides no teaching with regards to intrinsic stress and no factual basis for the Examiner's inference, the inference is improper. For example, the Examiner fails to identify any part of Wu et al. that teaches how the process is controlled such that film is produced with compressive stress, or the opposite with tensile stress, or with no mechanical stress. Again, it is the Examiner's responsibility to establish a prima facie case, which requires more than an unsupported assertion. Accordingly, claims 36-39 are allowable.

4. Gruen et al (5,989,511 or 5,772,760)

The Examiner rejected claims 1-4, 6, 32-33 and 36-39 under 35 U.S.C. 103(a) as being unpatentable over Gruen et al (5,989,511 or 5,772,760). Claims 5, 7 and 34-35 are patentable over Gruen et al ('511 and '760).

Generally speaking, "to establish a *prima facie* obviousness of the claimed invention, all the cited limitations must be taught or suggested by the prior art." *In Re Royka*, 490 Fed. 2d. 981 (C.C.P.A., 1974). That is, there must be objective support to a rejection under 35 U.S.C. 103(a).

As discuss in Applicant's original Response of January 9, 2006, Gruen et al. (5,989,511 and 5,772,760) acknowledges that the films contain sp2 carbon (i.e. graphite), albeit very little sp2 carbon. However, the Gruen et al. is does not explicitly state whether this very little amount of sp2 carbon is within the claimed ranges, or of a greater amount.

Although neither Greun et al. patents explicitly identify the weight percent of graphite inclusions, the Examiner contends that an inference may be made that the

amount graphite inclusions taught by Gruen et al. ('511 and '670) is within the ranges of claims 1, 32 and 33 since "other references that include hydrogen as a precursor show that the graphite in the diamond film is etched away from the final product."

The Examiner's inference is improper for a multitude of reasons. First, the Examiner does not identify any of these "other references." Second, the Examiner does not demonstrate that graphite in these other references is sufficiently etched away from the diamond film in order to meet the weight percent of graphite as claimed by the Applicant. Third, if by "other references" the Examiner is referring to the prior art cited herein, the inference would be incorrect as none of the other references teach a diamond film achieving the claimed weight percent of graphite inclusions by etching or any other means. In fact, the Examiner has not presented a single patent, publication, scientific article or text showing a nano-crystalline diamond matrix having graphite inclusions within the claimed limitation. As the Examiner's inference is not properly supported, a prima facie case of obviousness cannot be sustained. Accordingly, claims 1, 32 and 33 are believed to be in condition for allowance, and claims 2-7 and 34-39 which depend from claim 1 are necessarily also allowable.

Applicant notes that the Examiner attempts to place the burden on the Applicant to establish non-obviousness, instead of properly constructing a prima facie case. In this regard, the Examiner states that the burden is on the Applicant since "the prior art discloses a product which reasonably appears to be either identical with or only slightly different than a product in a product by process claim." (Emphasis added.). Applicant claims are product claims, not product by process claims. Accordingly, the Examiner's burden is not discharged.

5. New claims 41-43

New claims 41 – 43 include the limitations of a diamond film having an average root mean square surface roughness of less than 5.00 nm, 2.00 nm and 1.50 nm,

respectively. For the reasons discussed in detail above (and in Applicant's first Response of January 9, 2006 with regards to Gruen et al. ('511 and '760) with regards to claims 7, 34 and 35, none of the cited prior art teach or suggest these claimed limitations. Accordingly claims 41-43 are believed to be in condition for allowance.

Applicant hereby petitions under 37 CFR 1.136(a) for a three-month extension of time to respond to the Office action mailed April 5, 2006.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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